MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2018/2019

DCT5038 – DATA COMMUNICATIONS AND NETWORKING
(DIT & DBIS)

16 OCTOBER 2018
2:30 p.m. – 4:30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENT:

1. This question paper consists of **THREE (3)** pages.

2. There are **FIVE (5)** structured questions in this paper. Each question carries total of **20 Marks**.

3. Answer **ALL** questions in the **Answer Booklet** provided.

Structured Questions [100 marks]

Instruction: Write your answers in the Answer Booklet.

Question 1

a) Briefly explain what will happen if one of the cables is damaged in the following topology:

    i.   Mesh
    ii.   Ring

(2 marks)

b) Based on the *Figure 1*, name the label A until C in OSI layer. Briefly describe its function and the type of address that being used of these layers.

| Application Layer |
| Presentation Layer |
| Session Layer |
| C |
| B |
| A |
| Physical Layer |
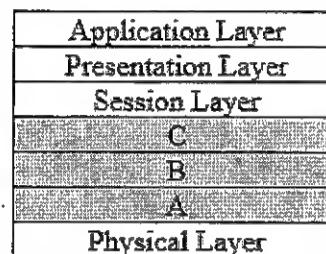
Figure 1

(9 marks)

c) A periodic signal is decomposed into five waves with frequencies of 150, 200, 240, 350 and 450Hz.

    i.   Calculate the bandwidth of the signal.
    ii.   Draw the frequency spectrum, assuming all components have maximum amplitude of 15V.

(6 marks)

d) A document is sent out from a station with the length of 450 byte. Calculate its transmission time if the bandwidth of the network is 200 kbps. Write your answer in milliseconds (ms).

(3 marks)

[TOTAL 20 MARKS]

Question 2

a) Draw a digital signal of a data stream 00101101 with the encoding schemes below:

    i.   Manchester
    ii.   AMI

(8 marks)

Continued...

b) A signal has a sampling rate of 15,000 sample/s. Calculate its bit rate if there are 8 bits per sample.

(2 marks)

c) Draw the constellation diagram for the following cases. Determine the phase for each cases and define the type of modulation (ASK, FSK, PSK or QAM).

     i.   The data points at (2, 0) and (-2, 0)   (4 marks)
     ii.   The data points at (5, 0), (-5, 0), (5, 5) and (-5, -5)   (4 marks)

d) List **TWO** types of analog-to-analog conversion.   (2 marks)

[TOTAL 20 MARKS]

Question 3

a). Six channels, each with a 2×10^5 Hz bandwidth, are to be multiplexed together. If there is a need for a guard band of 20 kHz between the channels to prevent interference, what is the minimum bandwidth of the link? Write your answer in kHz.

(3 marks)

b) *Figure 2* shows TDM. Assume data rate for each input connection is 25kbps and 1 bit is taken from each input with no synchronizing bits, answer the following questions.

     i.   Calculate the size of an output frame in bits.   (2 marks)
     ii.   Draw the output data stream.   (2 marks)
     iii.   Calculate output frame rate.   (2 marks)
   iv.   Calculate output data rate.   (2 marks)
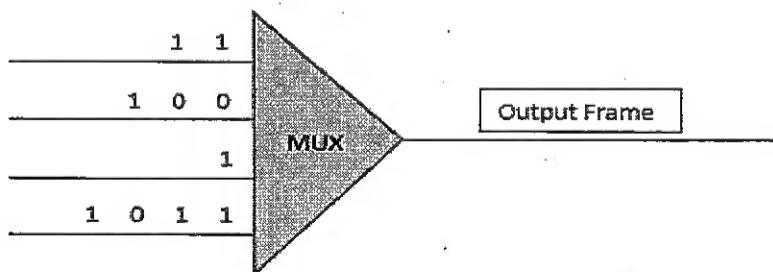
Figure 2

c) Briefly explain the way of light travels in fiber-optic cable. Draw the diagram to show how it works.

(5 marks)

d) State **FOUR** characteristics of infrared wireless transmission

(4 marks)

[TOTAL 20 MARKS]

Continued...

Question 4

a) A sender sends a block of information bits as follow:

11000011 10101101 00110010 11010110

Assume two dimensional parity check is used, show the complete block of information that will be received by the receiver.

(6 marks)

b) Given a bit stream of 01011001 00101111, identify the checksum that will be send by the sender.

(3 marks)

c) List **TWO** main methods that used for error correction.

(2 marks)

d) Draw the Stop-and-Wait ARQ diagram to illustrate the situation when the acknowledgement is lost.

(4 marks)

e) Define High-level data link control (HDLC) and state **THREE** characteristic for Asynchronous Balanced Mode (ABM) in HDLC.

(5 marks)

[TOTAL 20 MARKS]

Question 5

a) Briefly explain how Carrier Sense Multiple Access (CSMA) p-persistent strategy works and list **TWO** advantages of this strategy.

(5 marks)

b) Briefly explain **TWO** types of network that defined by Bluetooth.

(4 marks)

c) Differentiate between hub and bridge.

(6 marks)

d) Briefly describe Virtual Circuit Identifier (VCI). Draw a diagram of VCI to show when a frame arrived and leave at a switch.

(5 marks)

[TOTAL 20 MARKS]

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